TWO STAGE ATTACHMENT ANCHOR

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to a connecter assembly for use in vehicular structures. More particularly, the invention is directed to a connector assembly for attaching a hardware component and a trim panel to a vehicular structure.

Description of the Related Art

The installation of hardware components and a trim panel to a vehicular structure, such as a vehicle door, is an inefficient, multi-step procedure. Typically, each hardware component and trim panel must be aligned to a receiving aperture on the vehicular structure, and then a plurality of fasteners must separately secure the components to the vehicular structure. These procedures are labor-intensive and time-consuming.

SUMMARY OF THE INVENTION

To solve these and other problems, a connector assembly for attaching a hardware component and a trim panel to a vehicular structure comprises a shank including a head end and an anchor end for securing the hardware component to the vehicular structure, and a head operatively coupled to the shank. The head includes a trim retaining end for securing the trim panel, a shank engaging end, and a break neck therebetween. The trim retaining end breaks from the head at the break neck when a load is applied to the head, thereby allowing removal of the trim panel from the hardware component and the vehicular structure.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

Figure 1 is a partial cross-sectional view of a connector assembly when the connector assembly is not fully assembled according to an embodiment of the invention;

Figure 2 is a partial cross-sectional view of the connector assembly of Figure 1 when fully assembled; and

Figure 3 is a partial cross-sectional view of the connector assembly of Figure 2 when attaching a hardware component and a trim panel to a vehicular structure.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Figures 1 and 2, a connector assembly, generally indicated at 10, includes a shank 18 and a head 20. The shank 18 has a first, head end 22 and a second, anchor end 24. The head end 22 of the shank 18 is of a generally C-shaped cross section that includes a top surface 30 in the form of a shoulder that overhangs a centrally disposed central portion 31. A plurality of slots 32 are disposed through the shoulder 30 such that the inside wall of the head end 22 extends radially outward and is substantially flush with the inside wall of the central portion 31 of the head end 22. As described in more detail below, the head end 22 of the shank, and in particular the shoulders 30 retain the head 20 when the connector assembly 10 is assembled.

The shank 18 further defines a threaded passage 34 extending from the head end 22 to the anchor end 24 for engaging a screw 36. As shown in Figure 1, the screw 36 is partially received in the threaded passage 34. When the screw 36 is further received into the threaded passage 34, the screw 36 causes the shank 18 to extend radially outward, resulting in the enlargement of a bulbous portion 38, as shown in Figure 2. The length of the bulbous portion 38 may be any desirable length. In the illustrated embodiment, the bulbous portion 38 extends radially outward between an upper shaft portion 35 and the anchor end 24 of the shank 18. The screw 36 may be removed by conventional means once the head 20 is disengaged from the shank 18, as will be described below. The partial or full removal of the screw 36 causes the bulbous portion 38 of the shank 18 to retract radially inward, as shown in Figure 1. When the bulbous portion 38 is retracted inwardly by the

partial or full removal of the screw 36, the shank 18 may be easily removed from the vehicular structure 16 (Figure 3) when desired.

The head 20 has a trim retaining end 40 and a shank engaging end 42. The trim retaining end 40 includes an upper disc 44, a lower disc 46, and an intermediate portion 48 positioned therebetween. The head 20 also includes a break neck 50 disposed between the trim retaining end 40 and the shank engaging end 42. The break neck 50 is formed with a reduced diameter than the remainder of the head 20 so as to enable the head 20 to break in one or more pieces at the break neck 50 under a predetermined load. A plurality of tabs or prongs 52 is formed at the shank engaging end 42 of the head 20 to hold the head 20 in secure engagement with the shank 18. The prongs 52 are dimensioned so as to be capable of being received within the slots 32 and the central portion 31 of the shank 18, as shown in Figure 2. It is preferred, but not necessary, that the number of prongs 52 correspond to the number of slots 32 in the shoulder 30. Although three prongs are shown in the illustrated embodiment, it is contemplated that any desirable number of prongs may be formed so long as the prongs do not interfere with the break away function of the connector assembly 10, as will be described below.

The head 20 may also include a "pine cone" or "Christmas tree" section 54 formed between the lower disc 46 and the break neck 50. Alternatively, the section 54 can be omitted entirely from the design of the head 20, leaving only a shaft section between the lower disc 46 and the break neck 50.

In the first stage, the connector assembly 10 attaches a hardware component 12, such as a window regulator or a wiring harness, and a trim panel 14 to a vehicular structure 16, as shown in Figure 3. First, installation of the hardware component 12 and the trim panel 14 to the vehicular structure 16 is accomplished by securing the trim retaining end 40 of the head 20 of the connector assembly 10 to the trim panel 14. A back surface of the trim panel 14, or the side of the trim panel 14 not visible to a vehicle passenger, typically has a plurality of raised bosses 41 thereon, commonly referred to a "doghouse", for receiving the trim retaining end 40. The attachment of the trim retaining end 40 to the bosses 41 can be accomplished by inserting the upper disc 44 into the boss 41 while the lower disc 46 abuts the bottom surface of the boss 41 and prevents unwanted vertical movement of the connector assembly 10.

Next, the screw 36 is fully inserted within the threaded passage 34 by rotating the screw 36. As mentioned above, the screw 36 causes the bulbous portion 38 of the shaft 18 to expand radially outward when the screw 36 is fully received within the threaded passage 34, as shown in Figures 2 and 3. It should be noted that the order in which the screw 36 is inserted within the threaded passage 34 and in which the trim retaining end 40 is inserted into the boss 41 is not important and be performed in any desirable order independently of each other.

Then, the prongs 28 of the head 20 are inserted into the slots 32 in the shoulder 30 and the head 20 rotated either in a clockwise or counterclockwise direction such that the prongs 28 are no longer aligned with the slots 32. When the prongs 28 are no longer aligned with the slots 32, the prongs 28 are retained within the central portion 31 of the head 20 so as to secure the head 20 to the shaft 18.

Next, the connector assembly 10 with the trim panel 14 secured therewith is inserted through an aperture (not shown) of the hardware component 12 and the vehicular structure 16 having a diameter slightly larger than the diameter of the upper shaft portion 35. The connector assembly 10 is advanced through the aperture until the head end 22 of the connector assembly 10 abuts the hardware component 12. At this point, both the hardware component 12 and the vehicular structure 16 are disposed between the head end 22 and the anchor end 24 of the connector assembly 10. Because the diameter of the head end 22 and the bulbous portion 38 is greater than the diameter of the upper shaft portion 35, both the hardware component 12 and the vehicular structure 16 are held in place between the head end 22 and the bulbous portion 38 of the connector assembly 10. In this manner, the trim panel 14 and the hardware component 12 are secured to the vehicular structure 16 by a positive, snap-in type of attachment using the bulbous portion 38 of the connector assembly 10.

Servicing of the various hardware components 12, such as a window regulator or a wiring harness, may be needed from time to time. To this end, the trim panel 14 may be removed from the vehicular structure 16 and the hardware component 12 attached therewith by application of a load to the break neck 50 of the head 20. In the second stage, application of the load to the head 20 will cause the head 20 to break off from the shank 18, allowing for removal of the trim panel 14. The head 20 may break into two pieces at the

break neck 50, and both pieces are removed from the work area before servicing. Alternatively, the head 20 may break from the shank 18 as a unitary piece. In the second stage, the removal of the trim panel 14 allows for easy access to the hardware components 12 for servicing. For re-installation of the trim panel 14 after servicing, the trim panel 14 is attached to the vehicular structure 16 by conventional trim panel installation methods, such as the insertion of individual fasteners along the perimeter of the trim panel 14.

It should be noted that the connector assembly 10 of the invention does not replace these conventional trim panel perimeter fasteners. However, the connector assembly 10 does replace conventional hardware fasteners used to secure the hardware components 12 to the vehicular structure 16. The connector head 20 is not reusable for attachment of trim panel 14 to the hardware 12 or vehicular structure 16. The connector shank 18 is reusable for attachment of the hardware components 12 to the vehicular structure 16. The shank 18 can be inserted through openings in the hardware components 12 and vehicular structure 16, then by having the screw 36 fully driven to engagement, re-secure the hardware components 12 with the vehicular structure 16 between the re-enlarged bulbous portion 38 and the head end 22. Alternatively, the screw 36 may be fully driven to engagement prior to snap in insertion through the fastener holes of the hardware components 12 and vehicular structure 16.

Alternatively, after the removal of the trim panel 14, the hardware component 12 may also be removed from the vehicular structure 16 by unscrewing the screw 36 located inside of the passage 34. As shown in Figure 2, the screw 36 becomes visible at the head end 22 of the shank 18 after removal of the head 20 and the trim panel 14. The screw 36 may be removed by conventional means, thereby releasing the hardware component 12 from the vehicular structure 16.

It is contemplated that the connector assembly 10 may additionally serve as a locator for alignment of the trim panel 14 with a vehicular structure 16, such as a vehicle door. After installation of multiple connector assemblies 10 to secure the hardware components 12 and the trim panel 14, the anchor end 24 of the connector assembly 10 may assist in locating the trim panel 14 to the vehicular structure 16. The connector assemblies 10 will not replace conventional locators, but may be used to complement these conventional locators in aligning the trim panel 14 to the vehicular structure 16.

It will be appreciated that the illustrated embodiment of the invention as described above can be applied to other ventilation systems within a vehicle, such as a ventilation system for a vehicle dashboard, or the like.

While the invention has been specifically described in connection with certain specific embodiments thereof, it is to be understood that this is by way of illustration and not of limitation, and the scope of the appended claims should be construed as broadly as the prior art will permit.